

# Lesson Plan

## Recycling

### Grade Level

- K-6

### Main Ideas

- There are different types of natural resources and it is important that we work to conserve them.
  - Reducing and reusing products can help save natural resources for the future.
  - Buying post-consumer materials is a crucial step to close the loop in the recycling process
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- There are thousands of jobs in the recycling field, including those at IDEM.

### Objectives

To communicate to children the importance of conserving natural resources and how effective the process of recycling can be.

### Materials Needed

- Garbage Pizza
- Waste Category Percentage Sheet:  
["What's in Our Trash?"](#)
- Mini Trash Can

### In this lesson...

- [Teacher Preparation](#)
- [Presenter Preparation](#)
- [Lesson & Activities](#)
- [Taking it Further: Additional Activities](#)
- [Indiana State Science Standards Covered in this Presentation \(K-6\)](#)
- [Glossary of Recycling Terms](#)
- [Additional Presentation Materials](#)

## Teacher Preparation

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**For use when a teacher is giving the presentation on his or her own**

### Overview

This presentation is designed to help students recognize the importance of conserving our resources, and understand how easy it is to recycle.

### Materials Needed

The following items should be gathered before beginning the presentation:

- Garbage Pizza
- Waste Category Percentage Sheet:  
["What's in Our Trash?"](#)
- Mini Trash Can

You also may want to complete additional activities in which case you will need to prepare the materials ahead of time.

### Additional Resources

Check out the "[Taking it further](#)" section for other activities that can help you integrate this presentation into a larger lesson plan or thematic unit, follow-up the presentation with more activities, or simply give you ideas for future lesson plans.

The [Indiana State Science Standards](#) covered in this program have also been provided for you, allowing you to cover the standards with an environmental twist. Furthermore, a [glossary of recycling terms](#) covered in the presentation is provided at the end of this lesson plan.

## Presenter Preparation

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**For IDEM staff members giving the presentation**

### Overview

This presentation is designed to help students recognize the importance of conserving our resources, and understand how easy it is to recycle.

### Materials Needed

You should prepare the materials you are to bring prior to your presentation. Contact Chad Trinkle at (317) 233-9479 with any questions you may have regarding where to find them or how to use them.

- Garbage Pizza
- Waste Category Percentage Sheet:  
["What's in Our Trash?"](#)
- Mini-Trash Can

### Presentation Tips

- Read through the presentation beforehand to become comfortable with the information presented and to identify any alterations you want to make.
- The outlined presentation is merely a rough guideline. You are not expected to get through all the information available; feel free to pick and choose which parts to present based on time constrictions, your personal preferences, and age of your audience.
- Younger audiences are more likely to get restless. Be sure to keep them entertained.
- Provide positive feedback to your students as you go. Remember to smile at them and encourage them to participate.
- Have fun! Instructor enthusiasm is contagious, especially with small children.

## Lesson & Activities

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### A. Introduction

*Recycling is one of the best ways for citizens to make a direct impact on the environment.*

It helps the environment in a number of ways. First of all, recycling reduces energy use. For example, recycling aluminum uses 95% less energy than producing it from raw sources. Recycling also conserves the natural resources on Earth like plants, animals, minerals, fresh air and fresh water. Recycling saves space in the landfills for future generations of people. If we use up all the space in landfills by not recycling today, in future there will not be any space left to store trash.

### B. Conserving Resources

*There are different kinds of resources that we can help save by recycling.*

- Natural resources are things like plants, animals, minerals, fresh air and fresh water. These are found naturally on our planet and are not produced by humans.
- Renewable resources are resources that naturally replenish themselves like trees, fresh air, fresh water, crops, and wildlife. Even though they are called "renewable", people cannot waste or misuse them now or they could become endangered or even disappear.
- Nonrenewable resources are resources that have a limited availability on Earth. Once used, these resources cannot be renewed within our lifetime.

### C. The First Steps: Reduce and Reuse

*Because our resources are so precious and many cannot be replaced, it is important that we reduce the amount that we use.*

Often, resources are used carelessly and inefficiently, without much thought to conservation. Reducing the amount of resources used not only cuts back on the amount of resources used but also on the amount of pollution that would be created in making them. This means we should conserve our resources such as using less paper by using both sides of a sheet of paper or less water by turning off the faucet while we are brushing out teeth. Look for other ways we can reduce the amount of resources we use.

Another way to protect our natural resources is to reuse.

This means that one should avoid making more trash or wasting resources and energy by reusing things that are already made. This includes donating used clothing and items to those who need them, borrowing things instead of buying them, and avoiding disposable products.

## D. What is in our trash?

### Activity # 1<sup>1</sup>

**Garbage Pizza, a demonstration for the entire class.**

**Purpose:** To show students what's in a landfill using percentages, math, and fun props

**Materials:** Garbage Pizza, Waste Category Percentage Sheet: "[What's in Our Trash?](#)", mini-trash can

**Instructions:**

- **K-3:** Discuss with students all of the different categories of trash that one might find in a landfill. Ask them to name the categories and list them on the board: paper, glass, metal, plastic, food waste, yard waste, household hazardous waste, and "other." Next, explain the pieces of the garbage pizza to them as the amount of paper, plastics, etc. that they would find if they were to dig through a landfill. Once you have gone through all of the pizza, ask the students which pieces they think could be recycled, putting away each piece as they call it out, leaving only the slice labeled "other" and explain that some of the "other" materials could be reused.
- **4-6:** This activity can be extended for older audiences by using the mini-trash activity. The mini-trash can contains 8 items, each representing one of the major categories of trash you will be discussing. Divide the students into groups, giving each one of them a mini-trash can. Ask them to assign a percentage to each item based on how much trash they think it represents in the landfill. Give them five minutes to come up with their answers; reveal the correct percentages using the garbage pizza.

**Discussion/ Follow-up:** Ask the students how the actual percentages compared to their expectations. Discuss with them how easy it would be to recycle a great percentage of the trash that is instead put into a landfill.

## E. Next Step: Recycle

*When recycling, one must be careful to do so properly.*

Many materials can be recycled, a few of these include:

- Paper Products (newspaper, corrugated cardboard, magazines, etc.)
- Metals (aluminum, tin, steel)
- Glass Products (bottles and jars)
- Plastics (drink bottles and milk jugs)

Some recycling companies require that you separate every kind of material (ex: plastics must be separated from metals or glass, and each type of paper product must be separated such as newspapers, cardboard, magazine, or glossy papers), while some companies only require that you can separate your paper products from all other materials and the rest can all go into one container.

Another item to check ahead of time is plastic. Every plastic material is assigned a number that can be found somewhere on the container (usually on the bottom) that lets you know what type of plastic it is. Only certain types of plastics can be recycled. (See "[Plastic Packaging Resins](#)" Handout)

<sup>1</sup> Adapted from Lake County SWMD Environmental Recipe Book.

Once it is determined to what degree the recyclables must be sorted, one should follow a few small steps to complete the proper recycling process:

1. Rinse out containers to avoid attracting pests.
2. Don't put unacceptable materials into the recycling bin, including food.
3. Don't throw everything into the same bin! Instead, separate your recyclables into the proper categories required by your recycling hauler.

## **F. Other Recycling Methods**

*There are many other ways in which we recycle, but we may not have thought about these activities as recycling.*

- Composting our yard waste and food scraps (except for meat and bones) is an excellent way of reducing the amount of garbage we make. Composted material is really good for gardens, flower beds, or starting a worm bed.
- Another good way to recycle things is to give unwanted items to charity, friends and neighbors, or to hold a garage sale to promote the reuse of your used materials instead of disposing of them.
- There are many great things that one can make out of reused materials. Jewelry, clothing, accessories, and household decorations can be made from things that would otherwise be discarded.

## **G. Final Step: Buy Recycled**

*In order to complete the recycling process, not only is it important to reduce, reuse, and recycle but also to "BUY recycled".*

This means buying products that are packaged in or made of materials that are easily recycled. This is important because it reduces the amount of material that ends up in the landfills or incinerators. The easier it is for a material to be recycled, the more likely it will be recycled.

Another way to buy recycled is to purchase items that contain materials that have already been recycled. This is called "Post Consumer." Try to look for products containing the highest amount of post-consumer material. Even products that say "100% recycled material" on them are not always made of post-consumer materials, so be careful to look for the post-consumer content label.

### **Why Buy Recycled?**

1. It encourages companies to use recycled materials in their products.
2. It conserves our resources.
3. It is cost-efficient, because the price reflects the price of the product rather than the package.

When we recycle, the materials we put in the bins are collected and then stored away where they will sit until there is a demand for the materials to be used again and then turned into new products. Unless we create a demand by buying items made of recycled material, these huge bins will stay in warehouses. Only buying recycled materials can make all of our hard work recycling our own products worthwhile!

## **H. IDEM Careers in Recycling**

*There are thousands of people that work in recycling in Indiana.*

At IDEM, we manage money that is given out in grants to local communities to begin or continue working on recycling efforts. We also help with the organization of special recycling events in local places such as at the State Fair, presentations to schools like yours, and for special days like America Recycles Day on November 15th.

***Other jobs in the recycling field include:***

- Recycling Truck Driver
- Planning Recycling Routes
- Organizing the Recycling Facility
- Designing new uses for recycled materials

## ***I. Conclusion***

Next time you start to throw something in to the garbage can, stop and check to see if it could be recycled. Look for the recycling symbol (and a number if it is made of plastic.) Remember how important it is to save natural resources and how you can help. And don't forget the four steps of recycling:

1. Reduce,
2. Reuse,
3. Recycle, and
4. Buy Recycled!



## Taking it Further

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IDEM's presentations are designed to suit both the environmental scientist with no experience in the classroom and the experienced educator who wants to give his or her students a fresh learning experience.

However, there are a few things that the trained teacher can offer that are not possible to replicate in a short presentation. This section provides that teacher with additional activities that can be used in place of or in addition to the ones in the lesson.

### Additional Activity #1<sup>2</sup>

#### Cookie Mining

**Purpose:** To introduce the concept of nonrenewable versus renewable natural resources

**Materials:** 1 bag of chocolate chip cookies, box of toothpicks

**Instructions:** Give each student (or teams of 2-3 students) a cookie and respective number of toothpicks. Have the students "mine" the chips out of the cookie with their drills (toothpicks). The only rule is that they may not touch the cookie with their bare hands. Give the students 3-5 minutes to mine.

**Discussion/Follow up:** Explain, by pointing out the different mining results, that the cookie represents the Earth and that we must be careful not to abuse it when obtaining natural resources for our use. Discuss with the students different examples of nonrenewable natural resources like coal, gas, oil, and renewable natural resources like trees, sunlight, water and things they can do to decrease their reliance upon them.

 You can also try this ["Cookie Mining" activity \[PDF file\]](#) from the [Indiana Department of Natural Resources](#)

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<sup>2</sup> Adapted from Lake County SWMD Environmental Recipe Book.



## **Additional Activity #2**

### **Sort it!**

**Purpose:** To show students how various everyday products can be easily sorted into different categories and recycled

**Materials:** notecards, pen, and tape for older kids; recyclable products for younger children

### **Instructions:**

- **3-5:** Each student is given a slip of paper with the name of a recyclable item on it (or an actual recyclable product, if you so choose) and must sort themselves into the correct stations: recycling center, reuse station, compost pile, or landfill.
- **6-12:** Students have a notecard with the name of a recyclable product written on it taped to their backs and must sort themselves into the major categories of recycling (paper products, glass, metal, compostable materials, etc) only by asking "yes" or "no" questions to their peers regarding their product.

### **Discussion/Follow-Up:**

With the younger age group, discuss why it is important to find out what recyclable materials are accepted in your local recycling programs and drop-off locations to lower the amounts of contamination.

Have the older kids discuss whether or not they were aware that recyclables had to be sorted to such a degree. Ask them if they recycle, and then ask those who do if they are aware of the requirements that their recycling company has in place.

### **Additional Activity #3**

#### **Recycle Relay**

**Purpose:** To teach students about recycling through a competitive relay race.

**Materials:** Two large boxes filled with various recyclable materials

**Instructions:**

Divide class into two competing teams for the relay race. Have students line up in their respective team lines. Each competing pair of students (one from each team) is read a question to which the answer is a recyclable or recycled-content item that can be found in large boxes 10 yards in front of them. They can collaborate with their teammates to figure out the answer if necessary. They must then run to the box, search for and retrieve the correct product, and run back to tag their next teammate. Repeat until all students have had a chance to participate.

### **Southeastway Park Recycling Relay Questions**

- Q: Find an item that is made from trees.  
A: Anything paper
- Q: If you were to dig through a landfill, what would you find the most of in it?  
A: Anything paper
- Q: Find an item that, when recycled, can be used again to make new cars, building materials, and pop cans.  
A: Aluminum cans
- Q: When oil from the ground is heated up and melted back down just right, we can make lots of great products. Find something you think was made from oil.  
A: Anything plastic
- Q: Find an item that, when recycled, can be used again to make new dishes, bottles, and bathroom tiles.  
A: Anything glass
- Q: The most commonly accepted plastics at the recycling stations are coded with a #1 or a #2.  
A: Find a plastic product that has a 1 or 2.
- Q: When shopping, you can be sure that several products are made from recycled materials. That means that when you buy certain things, the packaging has already been used at least once. We call these items "safe bets" because it is a pretty safe bet that it is made from something that has been recycled. Find a product that is considered a safe bet.  
A: Anything paperboard, glass, aluminum, or steel
- Q: You can also tell if something is made from recycled material by looking for the words "post-consumer" which means that somebody has already used it and it has since been made into a new product.  
A: Find a product with the words "post consumer" on it.
- Q: You can tell if a plastic bottle can be recycled by looking for the #1 or #2 on it.  
A: Find a plastic bottle with a 1 or 2.
- Q: The energy we save by recycling 1 of these will run a tv for 3 hours.



A: Aluminum can

Q: It takes this product 1 million years to decompose in a landfill.

A: Anything glass

Q: The official symbol for recycling is the 3 "chasing arrows."

A: Find something with these arrows on it.

Q: This product, when recycled and melted down can be used to make new carpet, road signs, and clothing.

A: Anything plastic

## **Landfill Dig Questions**

Q: This product is made from trees?

A: Anything paper

Q: Find three items that can be recycled.

A: Anything in the mock landfill!

Q: What type of product will you find most of in a landfill?

A: Paper products

Q: This product can be recycled and used for parts for new cars, building materials, and new cans.

A: Aluminum cans

Q: This type of product is made from the natural resource, petroleum.

A: Plastic products

Q: This product can be recycled and made into more bottles, tile, and dishes.

A: Glass products

Q: This product can be recycled and made into carpet, clothing, and road signs.

A: Plastic products

Q: The energy you save by recycling 1 of these "can" run a TV for 30 minutes.

A: Aluminum can

Q: The amount of this type of product that one person uses in a year would stack as tall as a 2 story building.

A: Paper

Q: Americans throw away enough of this product every three months to rebuild the entire American air fleet.

A: Aluminum cans

Q: The average automobile contains 44% of recycled versions of this product.

A: Steel

Q: This product is originally made from sand.

A: Glass products

Q: When recycled, five of these items provide enough fiberfill for a ski jacket.

A: 2-liter recycled pet bottles

Q: Every minute 127,093 of these products are recycled in the USA.

A: Aluminum cans

Q: This type of product makes up 39% of the items in a landfill.

A: Paper products

Q: This type of product makes up 9% of the items in a landfill.  
You will find more of it along shorelines than any other type of waste.

A: Plastic products

Q: This type of product makes up 6% of the items in a landfill. It can be found in its original form on the beach.

A: Glass products

Q: This type of product makes up 8% of the items in a landfill. It doesn't always have to be heavy.

A: Metal products

## **Additional Activity #4**

### **Where does your homework go?**

**Purpose:** To engage students in a class discussion surrounding the steps in the recycling process including the collection of recyclables, manufacturing of new products, and purchasing of new recycled content products.

**Materials:** Homework recycling poster

### **Instructions:**

- **3-5:** Have the students discuss why it is important to "close the loop" and have all three parts of the chasing arrows work. The actual collection of recyclables means nothing if they are not turned into new products and put back in stores for us to purchase.
- **6-8:** Older students can also be asked to draw a flow diagram on the board or overhead including all the different steps involved in producing a piece of paper from growing a tree in the forest until it is either recycled and made into a new product, or thrown away.

Start with going to the store to buy some paper and end with it being made into something else.

### **Consider these steps:**

1. Consumer buys a product made of paper.
2. Paper is used and consumed.
3. Paper is placed in recycling container.
4. Paper is taken to the curb for recycling or taken to a recycling drop-off site.
5. Paper is processed and shipped to a recycling center.
6. Paper is re-processed into something like a roll of paper towels.
7. Someone goes into the store to buy the new paper towel.
8. The recycling cycle is completed!

## **Additional Activity #5**

### **How'd they do that?**

**Purpose:** To teach students from what raw materials items are made

**Materials:** Bag of assorted recyclable materials.

### **Instructions:**

- **K-4:** Dump an assortment of recyclables into a big pile and have students come up to sort the pile into metals, plastics, paper, and glass. Next, discuss with them where these products came from and how they are made (see information on different products below).
- **5-8:** Divide the students into 5 groups.. Give one item to each of the five groups: a newspaper, an aluminum can, a steel food can, a plastic bottle - #1 PETE only, and a glass bottle. Have them examine the materials and work with their group to answer the following questions:
  - How was this material manufactured or how was it made?
  - What can this material, in turn, be recycled into?Give them 7-10 minutes to work. Finally, have each group report on their recyclable item.

### **So, how did they do that?**

- **Newspaper:** Paper comes from trees and is rolled into very long sheets before it is printed on. Newspaper can be recycled into other kinds of paper and cardboard. Also, some newspaper goes into insulation for our houses.
- **Aluminum:** Aluminum comes from bauxite ore that is dug out of the ground. Aluminum is taken from the bauxite ore and it eventually becomes aluminum. Aluminum cans are recycled back into new cans or other aluminum products such as lawn chairs and bicycle parts. Aluminum can be recycled over and over again.
- **Steel Food Can:** Steel food cans are made with steel that starts out as iron ore in the ground. We get a lot of our iron ore from Wisconsin and Minnesota. After iron is made into steel, it is rolled into sheets before it is made into cans. Some cans have a very thin coating of tin to protect the food - that is why they are sometimes called "tin cans." Steel cans are recycled back into other steel products such as toys, car parts, and refrigerators. Millions of tons of steel are recycled each year.
- **Plastic Bottle:** Plastics come from oil or natural gas that is mined from the earth. Oil is refined into various products like gasoline and oil for our cars and trucks and chemicals such as plastics. A plastic soda or water bottle can be recycled into interesting things like carpeting, t-shirts and fill for jackets and coats. Who would have thought that a soda bottle could be made into carpeting?! Other plastics can be recycled into such things as flower pots and plastic lumber.
- **Glass Bottle:** Glass is made from sand. The sand is heated up very hot - to a temperature of over 1000 degrees Fahrenheit. The liquid glass is poured into molds and as the hot glass cools, it makes the bottles that we are familiar with. Glass can be recycled over and over again to make new glass bottles. Glass also has other uses such as road building and fiberglass products.



## Indiana State Science Standards Covered in this Presentation (K-6)

### Kindergarten

#### Scientific Inquiry

K.1.1 Raise questions about the natural world.

#### The Scientific Enterprise

K.1.2 Begin to demonstrate that everyone can do science.

#### Matter and Energy

K.3.1 Describe objects in terms of the materials they are made of, such as clay, cloth, paper, etc.

### First Grade

#### Scientific Inquiry

1.1.1 Observe describe, draw, and sort objects carefully to learn about them.

#### Communication Skills

1.2.6 Describe and compare objects in terms of number, shape, texture, size, weight, color, and motion.

#### Models and Scale

1.6.1 Observe and describe that models, such as toys, are like the real things in some ways but different in others.

### Second Grade

#### Technology and Science

2.1.7 Recognize and describe ways that some materials, such as recycled paper, cans, and plastic jugs can be used over again.

#### Computation and Estimation

2.2.1 Give estimates of numerical answers to problems before doing them formally.

#### Matter and Energy

2.3.5 Investigate that things can be done to materials, such as freezing, mixing, cutting, heating, wetting, etc., to change some of their properties and observe that not all materials respond in the same way.

#### Interdependence of Life

#### Please Note

These Indiana State Science Standards apply only to the [Lesson & Activities](#) section of this lesson plan. They do not apply to the [Taking it Further: Additional Activities](#) section.

2.4.5 Recognize and explain that materials in nature, such as grass, twigs, sticks, and leaves, can be recycled and used again, sometimes in different forms, such as in birds' nests.

## **Third Grade**

### **Technology and Science**

3.1.8 Describe how discarded products contribute to the problem of waste disposal and that recycling can help solve this problem.

### **Manipulation and Observation**

3.2.5 Construct something used for performing a task out of paper, cardboard, wood, plastic, metal, or existing objects.

### **Reasoning and Uncertainty**

3.5.5 Explain that one way to make sense of something is to think of how it relates to something more familiar.

### **Models and Scale**

3.6.3 Explain how a model of something is different from the real thing but can be used to learn something about the real thing.

## **Fourth Grade**

### **Technology and Science**

4.1.9 Explain how some products and materials are easier to recycle than others.

### **Communication Skills**

4.2.4 Use numerical data to describe and compare objects and events.

### **Shapes and Symbolic Relationships**

4.5.4 Demonstrate how graphical displays of numbers may make it possible to spot patterns that are not otherwise obvious, such as comparative size and trends.

## **Fifth Grade**

### **The Scientific Experience**

5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds.

### **Technology and Science**

5.1.6 Explain how the solution to one problem, such as the use of pesticides in agriculture or the use of dumping for waste disposal, may create other problems.

### **Computation and Estimation**

5.2.2 Use appropriate fractions and decimals when solving problems.

## **Sixth Grade**

### **The Scientific Enterprise**

6.1.4 Give examples of employers who hire scientists, such as colleges and universities, businesses and industries, hospitals, and many government agencies.

6.1.5 Identify places where scientists work, including offices, classrooms, laboratories, farms, factories, and natural field settings from space to the ocean floor.

### **The Earth and the Processes that Shape It**

6.3.14 Give examples of some minerals that are very rare and some that exist in great quantities. Explain how recycling and the development of substitutes can reduce the rate of depletion of minerals.

6.3.16 Explain that human activities, such as reducing the amount of forest cover, increasing the amount and variety of chemicals released into our atmosphere, and farming intensively, have changed the capacity of the environment to support some life forms.

## **Glossary of Recycling Terms**

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### **Compost**

The fertilizing mixture of decomposed organic material.

### **Garbage (Trash)**

Any material considered worthless, unnecessary, or offensive that is thrown away.

### **Landfill**

A specially engineered site where wastes are buried.

### **Natural resources**

Materials supplied by nature that are useful or necessary for life, such as minerals, water, and wood.

### **Nonrecyclable**

Not capable of being reprocessed into new products.

### **Nonrenewable resources**

Resources that do not replenish themselves soon after being used.

### **Post-consumer Materials**

A product that contains previously used materials.

### **Recycle**

To reuse or remanufacture a material into products after the material has served its original purpose.

### **Reduce**

A purchasing option that entails either selecting: large, bulk quantity items that can be recycled and require less packaging; or small quantity items that are considered potentially hazardous household products.

### **Renewable resources**

Resources that replenish themselves naturally or can be created.

### **Reuse**

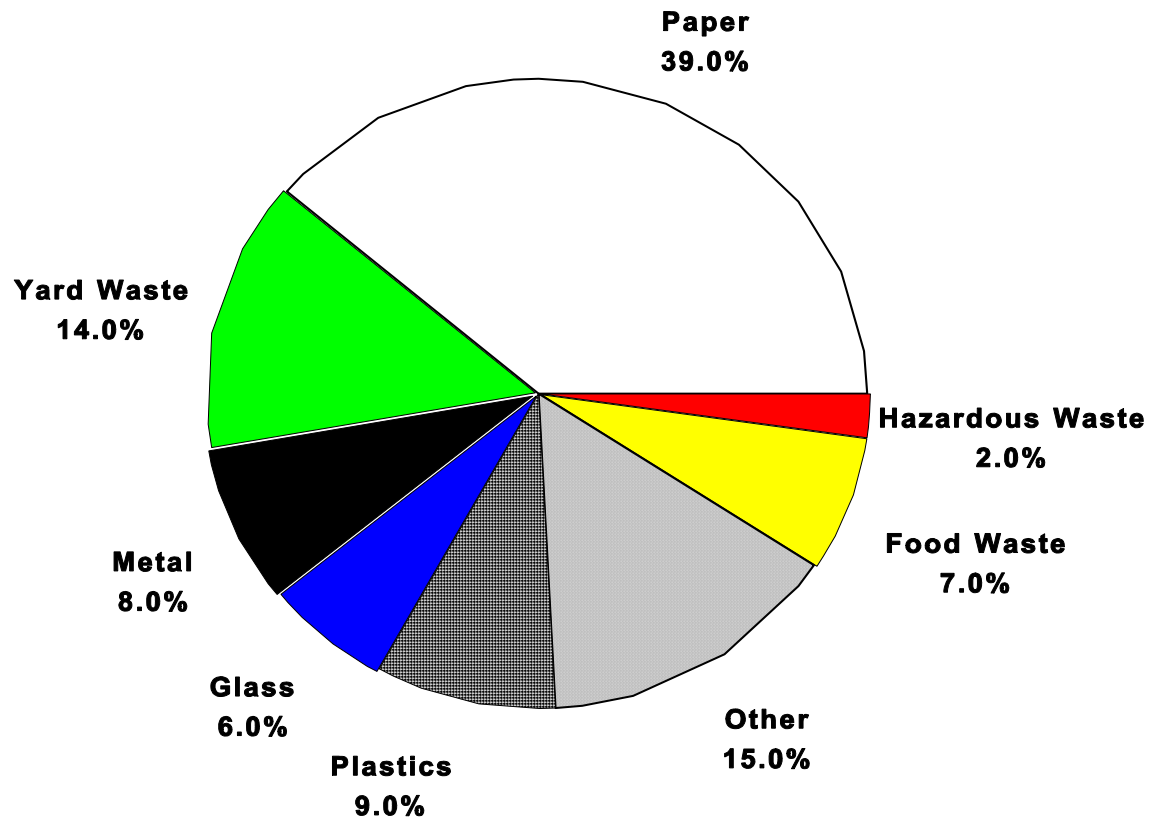
The use of a product more than once in the same form for the same purpose or for different purposes.

## Additional Presentation Materials





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- What's in Our Trash?
- Plastic Packaging Resins

# What's in Our Trash






# PLASTIC PACKAGING RESINS

| Codes  | Descriptions   | Properties   | Packaging Applications  | Recycled Products*  |
|--|--|--|---|---|
| <br><b>PETE</b> | <b>Polyethylene Terephthalate (PET or PETE)</b> : PET is clear, tough and has good gas and moisture barrier properties. This plastic is commonly used in PET soft drink bottles and many other injection-molded consumer product containers. Other applications include shipping, molding compounds and both food and non-food containers. Cleared, recycled PET flakes and pellets are in great demand for spinning fiber for carpet yarns and producing fiberfill and geotextiles. Polyester is its nickname.  | Clarity, strength/toughness, barrier to gas and moisture, resistance to heat.  | Plastic soft drink and water bottles, beer bottles, molasses bottles, peanut butter and salad dressing containers, overcandle film, overcandle pre-prepared food trays. | Fiber, tote bags, bottles, clothing, furniture, carpet.   |
| <br><b>HDPE</b>   | <b>High Density Polyethylene (HDPE)</b> : HDPE refers to a plastic used to make bottles for milk, juice, water and laundry products. Unpigmented HDPE bottles are frost resistant and have good barrier properties and stiffness. They are well-suited to packaging products with short shelf-lives such as milk, margarine, tubs and yogurt containers. Because HDPE has good chemical resistance, it is used for packaging many household as well as industrial chemicals such as detergents and bleach. Pigmented HDPE bottles generally have better stress crack and chemical resistance than bottles made from unpigmented HDPE.  | Stiffness, strength/toughness, resistance to chemicals and moisture, permeability to gas, ease of processing, ease of forming. | Milk, water and juice containers, frost-resistant detergent bottles, liquid detergent bottles, yogurt and margarine tubs, cereal box liners.                            | Liquid laundry detergent containers, drainage pipe, oil bottles, recycling bins, benches, pens, doghouses, vitamin bottles, floor tile, plastic tables, lumber, mailbox posts, fencing. |
| <br><b>V</b>      | <b>Vinyl (Polyvinyl Chloride or PVC)</b> : In addition to its stable physical properties, PVC has excellent chemical resistance, good weatherability, flow characteristics and static electrical properties. The diverse range of vinyl products can be broadly divided into rigid and flexible materials. Bottles and packaging styles are major rigid materials, but it is also widely used in the construction market for such applications as pipes and fittings, siding, carpet backing and windows. Flexible vinyls are used in wire and cable insulation, film and sheet, floor coverings, synthetic leather products, codings, blood bags, medical tubing and many other applications. | Versatility, ease of blending, strength/toughness, resistance to grease/oil, resistance to chemicals, clarity.                 | Clear food packaging, shampoo bottles, medical tubing, wire and cable insulation.   | Packaging tubes, desktop filing, rod-way gutters, mudflaps, film and sheet, flooring, codes, speed bumps, mats.   |
| <br><b>LDPE</b>   | <b>Low Density Polyethylene (LDPE)</b> : A plastic used predominantly in film applications due to its toughness, flexibility and relative transparency, making it popular for use in applications where heat sealing is necessary. LDPE is also used to manufacture some flexible lids and bottles and it is widely used in wire and cable applications for its properties and processing characteristics.   | Ease of processing, barrier to moisture, strength/toughness, flexibility, ease of sealing.                                     | Bread bags, frozen food bags, squeezeable bottles (e.g. honey, mustard).  | Shipping envelopes, garbage can liners, floor tile, furniture, film and sheet, composite bars, paneling, trash cans, landscape timber, lumber.  |

\*These products are made with 99 percent recycled plastic content, ranging from 10 to 100 percent.

# PLASTIC PACKAGING RESINS

| Codes  | Descriptions  | Properties  | Packaging Applications   | Recycled Products*   |
|--|---|---|--|--|
| <br>PP  | <b>Polypropylene (PP):</b> Polypropylene has excellent chemical resistance, is strong and has the lowest density of the plastics used in packaging. It has a high melting point, making it ideal for hot-fill liquids. PP is found in everything from flexible and rigid packaging to fibers and large molded parts for automotive and consumer products. | Strength/toughness, resistance to chemicals, resistance to heat, barrier to moisture, versatility, resistance to greases/oil. | Ketchup bottles, yogurt containers and margarine tubs, medicine bottles.   | Auto battery cases, sign lights, battery caddies, brooms and brushes, ice scrapers, oil funnels, landscape borders, bicycle racks, racks, bins, pallets, sheeting trays. |
| <br>PS    | <b>Polystyrene (PS):</b> Polystyrene is a very versatile plastic that can be rigid or foamed. General purpose polystyrene is clear, hard and brittle. It has a relatively low melting point. Typical applications include protective packaging, containers, lids, cups, bottles and trays.  | Versatility, insulation, clarity, easy to form.   | Compact disc jackets, food service applications, grocery store meat trays, egg cartons, aspirin bottles, cups, plates. | Thermometers, light switch plates, thermal insulation, egg cartons, vents, desk trays, rulers, license plate frames, foam packing, carry-out containers.                 |
| <br>OTHER | <b>Other:</b> Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin used in combination.  | Dependent on resin or combination of resins.  | Three and five gallon reusable water bottles, some citrus juice and ketchup bottles.                                   | Custom products, plastic lumber.   |

## Resin Identification Factoid:

The Society of the Plastics Industry, Inc. (SPI) introduced its resin identification coding system in 1988 at the urging of recyclers around the country. A growing number of communities were implementing recycling programs in an effort to decrease the volume of waste subject to tipping fees or landfills. In some cases, these programs were driven by state-level recycling mandates. The SPI code was developed to meet recyclers' needs while providing manufacturers a consistent, uniform system that could apply nationwide. Because municipal recycling programs typically only targeted packaging - primarily containers - the SPI coding system offered a means of identifying the resin content of bottles and containers commonly found in the residential waste stream. Recycling firms have varying standards for the plastics they accept. Some firms may require that the plastics be sorted by type and separated from other recyclables; some may specify that molded plastics are acceptable if they are separated from other recyclables, while others may accept all molded mixed together. Not all types of plastics are generally recycled, and recycling facilities may not be available in some areas.



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The American Plastics Council is a national trade association representing 26 of the nation's largest resin producers, including monomer and polymer production and distribution. Founded in 1988, APC works to make plastics a preferred material by demonstrating they are a responsible choice in a more environmentally conscious world.